DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application]This invention relates to the automatic dishwasher which has the function to start the automatic dishwasher which washes and dries tableware, especially to presume the quality of the dirt of tableware.
[0002]
[Description of the Prior Art]It is connected to feed water or a hot-water supply system, and an automatic dishwasher washes tableware using water or warm water (these are hereafter called wash water.), or a detergent, and it is a device which dries the tableware after washing.
[0003]In the conventional automatic dishwasher, two or more modes, such as the mode washed carefully for a long time and the mode which carries out short-time washing simply, are prepared about washing of tableware, When a user chooses the mode from the quantity of tableware, the quality of dirt, quantity, adhesion condition, etc. experientially, it has come to be able to do washing efficiently. For example, a user puts tableware into an automatic dishwasher, when there is much tableware, it is set as the mode washed for a long time, and when small, it is set as the mode which carries out short-time washing.
[0004]
[Problem(s) to be Solved by the Invention]Thus, although a user judges experientially the quantity of tableware, the quality of dirt, quantity, adhesion condition, etc. and chooses the mode conventionally, the optimal cleaning condition cannot necessarily be chosen by this. Although it differs in how depending on which dirt comes off with the soiled state of tableware, the kind of dirt, the time that neglected dirt, neglect environment, etc., it is because it is difficult for a user to grasp these correctly. Although the temperature of wash water changes with situations and how from which dirt comes off also with this temperature differs, it is also difficult for a user to grasp the temperature of wash water correctly. Therefore, it was difficult to determine the optimal cleaning condition in the conventional automatic dishwasher which depends on a user's experience and chooses the mode.
[0005]By the way, there is the quality of the dirt in relation to whether it is water solubility as one factor which influences how depending on which dirt comes off, and the optimal cleaning condition changes with qualities of this dirt. For example, it is more effective for the substance which is not water solubility like especially an oil among the dirt adhering to tableware to change how to fall with the temperature of wash water, and for the wash water of relatively high temperature to wash it. Therefore, although it is desirable to change the temperature of wash water according to the quantity of the

substance which is not the water solubility of the dirt of tableware etc. as for changing a cleaning condition according to the quality of dirt, when washing much especially tableware simultaneously, it is difficult [it] for a user to grasp the quality of the dirt adhering to those tableware correctly.

[0006]Then, the purpose of this invention is to provide the automatic dishwasher which made it possible to presume the quality of the dirt of tableware and to determine the optimal cleaning condition according to this.

[0007]

[Means for Solving the Problem]A stowage where the automatic dishwasher according to claim 1 stores tableware, and a cleaning means which washes tableware stored by this stowage, In a drying means which dries tableware washed by this cleaning means, a circulation means to circulate wash water which a cleaning means uses, and prewashing ****** which washes tableware by a cleaning means only using wash water without using a detergent, Before a washing start at each [after the time of an end of washing, and specified time elapse after the end of washing] time. By comparing a soiled state of wash water at each [which was detected by dirt detection means which detects a light transmission degree of wash water through which it circulates by a circulation means, and detects a soiled state of wash water, and this dirt detection means] time, It has an estimation means which presumes the quality of dirt of tableware in relation to whether it is water solubility.

[0008]By a dirt detection means, at each [after the time of an end of washing and specified time elapse after the end of washing] time, in this automatic dishwasher, it is detected by soiled state of wash water before a washing start in prewashing ******, and by an estimation means. A soiled state of wash water at each time is compared, and the quality of dirt of tableware in relation to whether it is water solubility is presumed. In this invention, not only a time of washing being completed strictly but a time of the neighborhood before and behind that shall be included with the time of an end of washing. Predetermined time after an end of washing shall mean sufficient time for a substance which is not water solubility to dissociate from wash water.

[0009]The automatic dishwasher according to claim 2 is further provided with a washing control means which controls a cleaning condition of a cleaning means according to an estimation result of an estimation means in the automatic dishwasher according to claim 1.

[0010]According to an estimation result of an estimation means, a cleaning condition of a cleaning means is controlled by this automatic dishwasher by washing control means.

[0011]In the automatic dishwasher according to claim 1 or 2 the automatic dishwasher according to claim 3, Based on a difference of a soiled state of wash water detected at the time before a washing start, and a soiled state of wash water detected at the time after specified time elapse after the end of washing, quantity of a substance of the water solubility of the dirt of tableware is presumed as the quality of dirt in relation to whether an estimation means is water solubility, Based on a difference of a soiled state of wash water detected at the time at the time of an end of washing, and a soiled state of wash water detected at the time after specified time elapse after the end of washing, quantity of a substance which is not the water solubility of the dirt of tableware is presumed.

[0012]

[Example]Hereafter, the example of this invention is described in detail with reference to drawings. Drawing 1 thru/or drawing 4 start one example of this invention.

[0013]Drawing 1 is an explanatory view showing the composition of the outline of the automatic dishwasher concerning this example. As shown in this figure, the automatic dishwasher of this example

has the stowage 11 which stores tableware, and the washing nozzle 12 which constitutes a cleaning means is formed in this stowage 11. One end of the washing-water-circulation way 13 is connected to this washing nozzle 12, and the other end of this washing-water-circulation way 13 is connected to the exhaust port 14 provided in the pars basilaris ossis occipitalis of the stowage 11. The washing pump 15 for circulating wash water in the middle of this washing-water-circulation way 13 is formed. A circulation means to supply again the wash water which blew off from the washing nozzle 12 to the washing nozzle 12 through the exhaust port 14 and the washing-water-circulation way 13 with these washing-water-circulation way 13 and the washing pump 15 is constituted. Although not illustrated, the automatic dishwasher has a device which performs hot water supply or feed water via the water supply hose connected to feed water or a hot-water supply system, and a device which drains wash water etc. via an exhaust hose.

[0014]The turbidity sensor 16 is attached to the washing-water-circulation way 13 in this example. This turbidity sensor 16 has the light-emitting part 17 and the light sensing portion 18 which were allocated so that it might counter across the washing-water-circulation way 13, detecting the light volume of the light which penetrates the wash water which is emitted from the light-emitting part 17 and passes through the washing-water-circulation way 13, and is received by the light sensing portion 18 -- the light transmission degree of wash water is detected and this detects the soiled state of wash water.

[0015]The navigational panel 19 is formed in the housing of the automatic dishwasher. The automatic dishwasher is further provided with the washing pump 15, the turbidity sensor 16, and the control device 20 that controls navigational panel 19 grade and controls the whole sequence, such as washing and desiccation. This control device 20 functions as a washing control means which controls a cleaning condition according to the estimation means which presumes the quality of the dirt of tableware, and the estimation result of this estimation means.

[0016]Drawing 2 is a block diagram showing the control device of the automatic dishwasher concerning this example, and the composition of the circumference of it. As shown in this figure, the control device 20 is provided with the clock 24 and the input/output port 25 for clocking CPU(central processing unit) 21, ROM(read only memory) 22, RAM(random access memory) 23, and time, These are mutually connected by bus 26. The motor 27 for rotating the washing nozzle 12 other than the above-mentioned turbidity sensor 16, the washing pump 15, and the navigational panel 19, the heater 28 for heating of wash water and desiccation, and the fan 29 that ventilates for desiccation are connected to the input/output port 25.

[0017]CPU21 controls sequences, such as washing and desiccation, by this control device 20 by executing the program stored in ROM22 by making RAM23 into working area.

[0018]Next, operation of the automatic dishwasher of this example is explained.

[0019]The automatic dishwasher of this example performs in order prewashing ****** which washes tableware only using wash water without using a detergent, this washing distance which washes tableware using a detergent, rinse distance, and dry distance. In this example, the quality of the dirt which related to whether it is water solubility in prewashing ****** is presumed, the cleaning condition in a subsequent sequence is determined according to the quality of this dirt, and washing is made to be performed by the optimal cleaning condition.

[0020]Drawing 3 is a flow chart showing the operation which presumes the quality of dirt in prewashing ******. As shown in this figure, in prewashing ******, hot water supply or feed water is started first (Step S101), Next, the output of the turbidity sensor 16 before washing, i.e., the output of the light

sensing portion 18, is read with the control device 20, and it stores in RAM23 in the control device 20 by making this into D_0 (Step S102). Next, the washing pump 15 is operated and ****** is started (Step S103). Next, the output of the turbidity sensor 16 in front of a washing stop is read, and it stores in RAM23 by making this into D_1 (Step S104). Next, after carrying out predetermined time neglect (Step S105), the output of the turbidity sensor 16 is read and it stores in RAM23 by making this into D_2 (Step S106). Next, from output D_0 of the turbidity sensor 16 at each time, D_1, and D_2, the quantity of the substance of the water solubility of the dirt and the quantity of the substance which is not water solubility are presumed, this presumes the quality of the dirt adhering to tableware (Step S107), and operation is ended.

[0021]Drawing 4 is a characteristic figure for explaining how to presume the quantity of a water-soluble substance, and the quantity of the substance which is not water solubility from output D_0 of the turbidity sensor 16, D_1, and D_2, and lapsed time [in / in a horizontal axis / prewashing ******] and a vertical axis show the output of the turbidity sensor 16.

[0022]The output of the turbidity sensor 16 corresponds to the transmittance of the light of wash water (for example, proportionality). Therefore, the size of the loss of power of the turbidity sensor 16 is equivalent to the quantity of the dirt of wash water. In drawing 4, output D_0 before washing is an output value of the turbidity sensor 16 in case there is no dirt in wash water. If wash water becomes dirty by washing, the output of the turbidity sensor 16 will decline to D_1. Therefore, D_0-D_1 corresponds to the quantity of all the dirt in the wash water with which the water-soluble substance and the substance which is not water solubility were mixed.

[0023]Since it will dissociate from wash water and will precipitate or float [which is not the water solubility of the dirt] after a washing stop if predetermined time neglect is carried out, the output of the turbidity sensor 16 rises to D_2. Therefore, D_0-D_2 corresponds to the quantity of the substance of the water solubility of the dirt in wash water. D_2-D_1 corresponds to the quantity of the substance which is not the water solubility of the dirt in wash water. The control device 20 presumes the quantity of the substance of the water solubility of the dirt which has adhered to tableware from D_0-D_2, and presumes the quantity of the substance which is not the water solubility of the dirt which has adhered to tableware from D_2-D_1. The rate of the substance of the substance of the water solubility of the dirt adhering to tableware which is not water solubility comparatively can also be presumed from the rate of D_0-D_2 to D_0-D_1, and D_2-D_1.

[0024]Based on the quantity of the substance of the water solubility of the dirt adhering to the tableware presumed as mentioned above, and the quantity of the substance which is not water solubility, the control device 20, actual washing [in / according to the quality of this dirt / the quality of the dirt adhering to tableware is presumed or it becomes dirty and comes out for example, there are many substances which are not water solubility, and / a subsequent sequence] -- disagreeable -- cleaning conditions, such as time of a rinse and a maximum temperature of the wash water heated with the heater 28, are controlled. For example, when it is presumed that it is dirt with many substances which are not water solubility, compared with the case of dirt with many water-soluble substances, the maximum

temperature of the wash water heated with the heater 28 is raised. Thus, according to this example, it becomes possible to perform optimal tableware washing operation.

[0025]it comes out [which the quantity of all the dirt adhering to tableware is presumed] from D_0-D_1, and may be made to change a cleaning condition according to the quantity of this dirt, such as changing the time of this washing The kinds (an oil, sauce, soy sauce, etc.) of dirt are presumed from the rate of a water-soluble substance and the substance which is not water solubility, and it may be made to change a cleaning condition according to the kind of this dirt.

[0026]Although just before the washing stop was adopted as a point in time at the time of the end of washing in the above-mentioned example, the time of washing being completed not only in this but strictly may be sufficient, and it may be immediately after the end of washing.

[0027]

[Effect of the Invention]As explained above, according to the automatic dishwasher according to claim 1, before the washing start in prewashing ****** at each [after the time of the end of washing, and the specified time elapse after the end of washing] time. Since the quality of the dirt of the tableware which detected the soiled state of wash water, compared the soiled state of the wash water at this each time, and related to whether it is water solubility was presumed, it is effective in becoming possible to determine the optimal cleaning condition according to the quality of this dirt.

[0028]Since the cleaning condition was controlled according to the estimation result of the quality of dirt according to the automatic dishwasher according to claim 2, it is effective in becoming possible to perform optimal tableware washing operation according to the quality of dirt in addition to the above-mentioned effect.

[0029]According to the automatic dishwasher according to claim 3, it is effective in the ability to presume especially the quantity of a water-soluble substance, and the quantity of the substance which is not water solubility as the quality of the dirt in relation to whether it is water solubility.

[Translation done.]